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(54) **Gas container valve with a residual pressure and/or non-return device.**

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Ministère de l'Economie  
Service de la Propriété Intellectuelle

Grand-Duché de Luxembourg

### Demande de brevet d'invention

- Loi du 20 juillet 1992 portant modification du régime des brevets d'invention
- Règlements grand-ducaux du 17 novembre 1997 - concernant la procédure et les formalités administratives en matière de brevets d'invention et de certificats complémentaires de protection - portant fixation des taxes et rémunérations à percevoir en matière de brevets et de certificats complémentaires de protection

Demande N° **9 0 2 5 4**

Date de dépôt: 24 juin 1998

Référence du déposant ou mandataire: **P-CEO-14/LU**

#### A. REQUETE

Le demandeur requiert (Les demandeurs requièrent) la délivrance d'un brevet d'invention.

##### 1. Titre de l'invention:

"Gas container valve with a residual pressure and/or non-return device"

##### 2. Demandeur

Nom, prénom ou  
dénomination sociale: **LUXEMBOURG PATENT COMPANY S.A.**

Adresse: **6, rue Helne, L-1720 Luxembourg (LU)**

Etat dans lequel est situé le domicile ou siège du demandeur: **Luxembourg**

Téléphone:

Telefax:

E-mail:

☐ Un (Des) demandeur(s) supplémentaire(s) est (sont) mentionné(s) sur une feuille en annexe

##### 3. Mandataire(s)

Nom(s), prénom(s):

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- ☒ Le(s) demandeur(s) déclare(nt) élire domicile auprès du (des) mandataire(s)  
☐ Un pouvoir général est déposé au Service de la Propriété Intellectuelle

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**4. Adresse postale au Grand-Duché de Luxembourg:**

Les communications du Service sont à envoyer à:

- ☐ l'adresse du demandeur mentionnée au point 2.  
☒ l'adresse des mandataire(s) mentionné(s) au point 3.  
☐ l'adresse suivante:

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**5. Désignation d'inventeur(s)**

Nom, prénom(s):

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- ☐ Un (Des) inventeur(s) supplémentaires est (sont) mentionné(s) sur une feuille en annexe  
☐ Une désignation d'inventeur(s) séparée est jointe en annexe

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**6. Déclaration de priorité**

Demande No

Date de dépôt:

Pays:

Déposant:

- ☐ D'autre(s) déclaration(s) de priorité sont mentionnées sur une feuille en annexe

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**7. Déclaration lorsqu'il s'agit d'une demande divisionnaire**

- ☐ La présente demande est une demande divisionnaire de la demande de brevet:

No:

Date de dépôt:

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**8. Déclaration lorsqu'il s'agit d'une demande fondée sur une demande internationale**

- ☐ La présente demande est fondée sur la demande internationale identifiée ci-dessous:

Date de dépôt:

No de dépôt:

No de Publ.:

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**9. Demande d'établissement d'un rapport de recherche d'antériorités**

Il est demandé l'établissement d'un rapport de recherche d'antériorités relatif à la présente demande:

- ☒ oui ☐ non
-

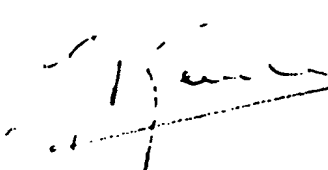


**10. Annexes**

- |  |                    |           |
|--|--------------------|-----------|
| <input checked="" type="checkbox"/> Description + revendication(s) | Nbre de pages:     | <b>18</b> |
|  | Nbre de revendic.: | <b>13</b> |
| <input checked="" type="checkbox"/> Figures                        | Nbre de planches:  | <b>3</b>  |
| <input checked="" type="checkbox"/> Abrégé                         |                    | <b>1</b>  |
| <input checked="" type="checkbox"/> Figure à publier avec l'abrégé | Figure N°: 4       | <b>1</b>  |
| <input type="checkbox"/> Traduction des revendications             | Nbre de pages:     |           |
- 
- ☐ Feuille avec demandeur(s) supplémentaire(s)  
☐ Feuille avec mandataire(s) supplémentaire(s)  
☐ Feuille avec déclaration(s) de priorité supplémentaire(s)  
☐ Feuille avec inventeur(s) supplémentaire(s)  
☐ Désignation séparée d'inventeur(s)
- ☐ Document(s) de priorité  
☐ Traduction document(s) de priorité  
☐ Document(s) de cession du droit de priorité
- ☐ Pouvoir  
☐ Copie d'un pouvoir général
- ☐ Autres:

**B. PROCÈS-VERBAL DE DÉPÔT**

La présente demande de brevet d'invention a été déposée au Ministère de l'Economie, Service de la Propriété Intellectuelle, à Luxembourg,

en date du 24 juin 1998 à 15.00 heures.

Le(s) déposant(s) / mandataire(s):	Pour le Ministre de l'Economie, p.d
 Nom du signataire <b>Jean BEISSEL</b>	  <b>Serge ALLEGREZZA</b> Attaché de Gouvernement 1 <sup>er</sup> en rang Chargé de la Direction du Service de la Propriété Intellectuelle

4/Pnts

## **Gas container valve with a residual pressure and/or non-return device**

### ***Field of the Invention***

The present invention relates to a gas container valve with a residual pressure and/or non-return device.

### ***Background of the Invention***

Gas container valves including a stop valve and a residual pressure device are well known in the art. The residual pressure device is conceived so as to automatically stop the emptying of the gas container if the pressure in the container falls below a determined value. Without such a residual pressure device, moisture or impurities could penetrate into an empty gas container, when the stop valve is not entirely closed after use. Most of these residual pressure devices are conceived to additionally perform a non-return function, i.e. to prevent a backflow of pressurized gas into the gas container. Such a backflow could indeed result in a degradation of gas purity.

In the filling station, it must of course be possible to unlock the residual pressure and/or non-return function in the container valve. Otherwise it would be impossible to completely purge the gas container or to fill it.

There are basically two different types of residual pressure systems for gas container valves.

A residual pressure system of the first type includes a check valve mounted axially in the valve outlet connection. This check valve provides the above described residual pressure and non-return functions. For purging and filling the gas container, the check valve is mechanically disabled by means of a nipple that is an integral part of a filling adapter, which is screwed on the outlet connection for filling the gas container. A valve assembly with such a

system is for example exhaustively described in the European patent application EP 0386740. It should be noted that this first type of residual pressure devices requires a lot of mounting space in the outlet connection of the gas container valve. Another disadvantage of such a system is that the residual pressure device is easily accessible through the outlet connection of the valve. It may therefore be easily disabled for consuming the residual gas volume that should be left in the bottle. Yet another disadvantage resides in the fact that filling nipples to be used with such valves are not yet standardized. In other words, a filling station needs several kind of interchangeable filling adapters, and it is often not obvious which filling adapter must be used with which valve. A further major disadvantage is that it is impossible to visually establish whether or not such a device has been disabled by an unauthorized person.

A residual pressure system of the second type is for example described in the German patent DE 870053. It includes a check valve that is mounted in a seat chamber in the valve body, upstream of the stop valve assembly and transversely to a gas passage connecting an input port to the stop valve assembly. The check valve includes a closing body associated to a valve seat in the seat chamber. A spring urges the closing body with a predetermined force against the valve seat. A screw-driven actuation device is mounted opposite of the check valve in a branch of the valve body. It includes a threaded actuation spindle screwable in a position, in which the front end of the actuation spindle pushes the closing body from its seat, thus disabling the check valve, i.e. preventing it from fulfilling its residual pressure and non-return function. The rear end of this actuation spindle projects out of the valve body. It has a squared end to screw the actuation spindle with the help of a key into a position, in which the check valve is enabled, i.e. in which the actuation spindle does no longer impede an axial stroke of the closing body. In order to have an indication, whether or not the customer has had access to the actuation device of the check valve, the rear end of the actuation spindle is covered with a cap, which is screwed on the valve body and secured against unscrewing with a

seal wire and a leaden seal. A first disadvantage of this valve is that the cap covering the lateral actuation spindle may prevent the use of a standard valve protection cap, which is usually screwed on the gas cylinder for protecting the gas cylinder valve during transport and storage. Another disadvantage of such  
5 a type of valve is that screwing a cap on the actuation spindle and securing it with a seal wire and a leaden seal is rather time consuming.

In order to make the valve of the German patent DE 870053 less cumbersome, European patent application EP 0458253 suggests to replace the spindle actuation device with a disabling device operated by means of a  
10 magnet. In order to disable the check valve, a strong magnet is applied on a cap on the outside of the valve body. This magnet attracts the closing element and pulls it from its seat. A first disadvantage of this system is that it is impossible to know whether or not the check valve has been disabled by an unauthorized person. Another disadvantage is that the closing element may  
15 flutter during the filling operation, because the attracting force of the magnet is sometimes not strong enough to compensate the hydrodynamic forces acting on the closing element in addition to the spring force.

### ***Object of the invention***

It is an object of the present invention to provide a gas container valve with a check valve device providing a residual pressure and/or a non-return  
20 function, said valve further including a device for disabling the check valve function and very simple means for reliably and rapidly detecting whether or not there has been an attempt to disable the check valve function in the valve.

Additional objects and advantages of the invention will be set forth in the description which follows or will become obvious from the description in view of  
25 the prior art, or may be learned by practice of the invention.

### ***Summary of the invention***

The gas container valve of the present invention includes a valve body

and a check valve mounted in the valve body so as to provide a residual pressure and/or a non-return function. The residual pressure function warrants that the emptying of the gas container is automatically stopped, if the residual pressure in the container falls below a determined value. The non-return

5 function prevents a backflow of pressurized gas in the gas container. Most often the check valve will perform both functions. A screw-driven actuation device is associated to the check valve for disabling its function (i.e. the residual pressure and/or a non-return function). This screw-driven actuation device includes a threaded actuation body, which is mounted in the valve body

10 so as to be screwable between a first position, in which it enables the check valve to perform its function, and a second position, in which it disables the check valve. In accordance with the invention the screw drive mechanism is mounted in the valve body, so that only a flat front face of the actuation body is accessible, when the actuation body is in its first position. This flat front face

15 includes an hole arrangement for inserting therein a key, so as to be capable of transmitting to the actuation body by means of said key a torque for screwing the actuation body from its first position into its second position. In accordance with an important aspect of the present invention, a flat seal is adhesively affixed to the accessible front face of the actuation body, so as to cover the

20 hole arrangement. It follows that the seal must either be removed, which will most likely damage it, or be pierced, if the actuation body is to be screwed from its first position into its second position for disabling the function of the check valve. If the seal is damaged, pierced or entirely removed, it has to be concluded that somebody has tried to disable the check valve. In other words,

25 as long as the seal is undamaged, one can be reasonably sure that the check valve function has not been disabled and that the gas container has not been refilled by an unauthorized person. Gas containers with an undamaged seal can for example be top-filled (i.e. they are refilled without purging the residual gas volume in the gas container), as one can be reasonably sure that the

30 residual gas contained in the container is an uncontaminated residue of the original gas that has been filled in the container by the company that has



affixed its seal on the front face of the actuation body. It will further be appreciated that the seal means of the present invention do not require a cap to be screwed on a branch of the valve body, which makes the valve less cumbersome and also less expensive. Furthermore, adhesively affixing a flat seal on a flat surface is of course a less time-consuming operation than screwing a cap on a branch of a valve body and securing it by means of a seal wire and a led seal to the valve body. Disabling the check valve function is also very easy. The corresponding key is introduced in the hole arrangement in the accessible flat front face of the actuation body, thereby automatically piercing the seal. With the key engaged in the hole arrangement, the actuation body can be easily screwed from its first position in its second position, thus disabling the check valve.

The hole arrangement in the flat front face of the actuation body consists preferably of several drilled holes. A particular gas company may have its customized hole arrangement in the flat front face, so that without the matching key, it will be difficult to disable the check valve for refilling the gas container.

In an preferred embodiment the hole arrangement consists of one central drilled hole, with several peripheral drilled holes. The central hole provides an easy alignment of the key in the axis of the actuation body, by introducing therein a central pin of the key. Peripheral pins of the key are introduced in the peripheral holes and have to transmit the screwing torque onto the actuation body.

The check valve normally includes a check valve seat associated to a gas passage in the valve body and a closing body associated to the check valve seat. The front end of the closing body cooperates with the check valve seat so as to be capable of sealingly obturating the gas passage in the check valve seat. A spring is associated to the closing body, so as to urge the closing body in the direction of the check valve seat.

In a first embodiment of the above check valve, the rear end of the closing body is slidably fitted within a bore of the actuation body, and the spring is

connected between the actuation body and the closing body, so as to urge the latter with a predetermined force against the check valve seat, when the actuation body is in its first position. The actuation body is in this case arranged in the valve body so that the spring force acting on the closing body  
5 decreases, when the actuation body is screwed from its first position into its second position.

The above described valve normally has a gas inlet port, a gas outlet port and a seat chamber containing the check valve seat. A first gas passage portion connects the gas inlet port to the seat chamber. A second gas passage  
10 portion extends downstream from the valve seat to the gas outlet port. The closing body is preferably arranged so as to be urged by the spring against the valve seat in the direction of flow of the gas from the gas inlet to the gas outlet. If this check valve has to perform a non-return function, the rear end of the closing body is for example sealingly received in the bore of the actuation  
15 body, so as to axially delimit therein a pressure chamber, and a gas passage extends through the closing body, so as to connect the pressure chamber to the second gas passage portion, when the front end of the closing body is seated on the valve seat. If the cross-section sealed by the closing body in the pressure chamber is bigger than the cross-section sealed by the closing body  
20 in the valve seat, then the closing body will be urged against its seat by a hydrostatic force, when the outlet port is pressurized with a higher pressure than the pressure in the gas container.

The above described valve preferably includes a limit stop in the bore of the actuation body, for limiting the stroke of the closing element in the direction  
25 of the check valve seat. Thus the closing body is reliably pulled back from the check valve seat, when the actuation body is screwed from its first position in its second position. It will further be appreciated that the above valve has the advantage that the threaded actuation body, the closing body and its spring form a pre-assembled unit which is simply screwed into the valve body.

30 It will be noted that a gas container valve normally includes a stop valve

assembly. The latter may be located either upstream or downstream of the check valve. Locating stop valve assembly upstream of the check valve has the advantage that the check valve assembly may be exchanged or repaired without emptying the gas container.

- 5        In an other, less compact embodiment, the valve of the invention has the closing body of the check valve slidably fitted in a bore of the valve body and the spring connected between the closing body and the valve body. The actuation body is arranged in the valve body axially opposite of the closing body. It includes a stem pushing the closing body away from its check valve
- 10    seat, when the actuation body is in its second position. When the actuation body is however in its first position, its stem does not prevent the spring from urging the closing body with a predetermined force against the check valve seat.

### ***Brief Description of the Drawings***

- Two embodiments of the invention will now be described in detail, by way
- 15    of non limiting examples, with reference to the accompanying drawings, in which:

- Fig. 1: is a three-dimensional view of a first embodiment of a gas container valve with a residual pressure and/or non-return device in an enabled status;
- 20    Fig. 2: the same view as in Fig. 1, showing the residual pressure and/or non-return device in a disabled status;
- Fig. 3: a cross-sectional view through the valve of Fig. 1, showing the residual pressure and/or non-return device in an enabled status;
- Fig. 4: an enlarged detail of Fig. 3, showing the residual pressure and/or non-
- 25        return device in a disabled status;
- Fig. 5: a sectional view along line B-B in Fig. 3;
- Fig. 6: a front view showing an enlarged detail of Fig. 2.

Fig. 7: is a three-dimensional view of a key for enabling/disabling the residual pressure and/or non-return device;

Fig. 8: is cross-sectional view through a second embodiment of a gas container valve with a residual pressure and/or non-return device in an enabled status.

### ***Detailed Description with Reference to the Figures***

The valve 10 shown in the Figures 1 to 6 is a high pressure gas container valve. It includes, in a common valve body 12, a stop valve device operated by a hand-wheel 14, a safety device 16 and a residual pressure and non-return device 18. As the stop valve device and the safety device are well known per se, they will not be described here.

The valve body 12 has a screwed socket 20 for screwing the valve 10 into an internal screw thread of the gas cylinder. As shown in Figure 5, an inlet gas passage 22 extends from an inlet port 24 through the socket 20 into a stop valve seat chamber 26. This stop valve seat chamber 26 contains a stop valve seat 28 for a stop valve closing body (not shown). Downstream of the seat 28 the stop valve seat chamber 26 is connected by means of a gas passage 30 to the residual pressure and non-return device 18. In other words, the residual pressure and non-return device 18 are located downstream of the stop valve device 18, so that it is possible to dismount the latter without emptying the gas cylinder.

As shown in Figure 4, the residual pressure and non-return device 18 comprises in the valve body 12 a seat chamber 32 with a check valve seat 34. Referring to Figure 3 it will be noticed that an outlet gas passage 36 extends downstream of the check valve seat 34 through the valve body 12, to form an outlet port 38 in an outlet connection 40. This outlet connection 40 has an external screw thread 42, for fixing thereon either an outlet adapter for supplying gas to a consumer or a filling adapter for filling the gas cylinder.

The residual pressure and non-return device 18 of the valve 10 will now be described in detail on the basis of Figures 3 and 4. It includes two main components: a check valve 44 and screw-driven actuation device 46 for disabling the function of the check valve 44.

5        The actuation device 46 includes a threaded, plug-shaped actuation body 48. The latter is screwed in an internal screw thread 50, which is cut in a cylindrical chamber 51 located in a branch 52 of the valve body 12. In this internal screw thread 50 the actuation body 48 is screwable between a first position, shown in Figure 3, in which the actuation body 48 is entirely enclosed  
10    in its chamber 51, so that only its flat front face 54 is accessible, and a second position, shown in Figure 4, in which the rear end of the actuation body 48, which carries the front face 54, projects out of the valve body 12. The front end of the actuation body 48 is received in a cylindrical bore and sealed therein by means of at least one O-ring 55 or any other adequate sealing means.

15        The check valve 44 comprises the check valve seat 34, a closing body 56 and a spring 58. The front end of the closing body 56 carries an O-ring 60, intended to cooperate with the check valve seat 34, so that the front end of the closing body 56 is capable of sealingly obturating the check valve seat 34 (see Figure 3). The spring 58 is connected between the actuation body 48 and the  
20    closing body 56, so that it urges the closing body 56 with a predetermined force against the valve check valve seat 34, when the actuation body 48 is in its first position, as shown in Figure 3. This spring is used to set a minimum pressure that must act in the seat chamber 32 upon a shoulder surface 59 of the closing body 56 in order to push the latter from its check valve seat 34 and to enable a  
25    gas discharge through the gas outlet passage 36. In other words, the check valve 44 provides a residual pressure function, i.e. it automatically stops the emptying of the gas cylinder through the valve 10, when the pressure in the gas cylinder drops below a predetermined pressure. It warrants thereby that a residual pressure is maintained in the cylinder, thus preventing moisture and  
30    impurities from penetrating into the gas cylinder, when the stop valve device is not entirely closed after use.

The rear end of the closing body 56 is slidably fitted within a bore 62 of the actuation body 48. A Quad-ring 64 seal or any other suitable sealing means seals the rear end of the closing body 56 in the bore 62, so that the closing body 56 axially delimits in the bore 62 a pressure chamber 66. A gas passage 68 extends through the closing body 56, so as to connect this pressure chamber 66 to the outlet gas passage 36, when the front end of the closing body 56 is seated on its check valve seat 34, as shown in Figure 3. If, in the situation of Figure 3, with the closing element 56 seated on its check valve seat 34, a pressurized gas source is connected to the outlet port 38, pressurized gas will penetrate through the gas passage 36 into the pressure chamber 66. As the cross-section sealed by the rear end of the closing body 56 in the pressure chamber 66 is bigger than the cross-section sealed by the front end of the closing body 56 in the check valve seat 34, the hydrostatic force acting on the closing body 56 will be oriented in the direction of the check valve seat 34. It will therefore be impossible to open the check valve 44 by connecting the outlet port 38 to a pressure source with a higher pressure than the pressure in the gas cylinder. In conclusion, in the situation of Figure 2, the check valve 44 also provides a non-return function, i.e. it prevents a backflow of gas through the valve 10 into the gas cylinder, if the pressure in the outlet port is higher than the pressure in the gas cylinder. It follows that the gas cylinder may not be refilled with a gas as long as the check valve 44 is not disabled.

The actuation device 46 is used for disabling the check valve 44. If the actuation body 56 is screwed from its first position, shown in Figure 3, into its second position, shown in Figure 4, the length of the spring 58 first increases, i.e. the spring force acting on the closing body 56 first decreases. After a certain stroke of the actuation body 56, a limit stop 68, which is located at the outlet of the bore 62, bears on the shoulder portion 59 of the closing body 56. From this moment the spring 58 urges the closing body 56 against the limit stop 68, and the actuation body 56 is able to pull the closing body back from its check valve seat 34. In other words, the closing body 56 is no longer able to obturate the check valve seat 34. It will be noted that in the device of Figure 4,

the limit stop 68 is embodied in a very simple manner by an inward deformation of the border of the bore 62.

It will further be appreciated that the threaded actuation body 48, the closing body 56 and the spring 58 form a pre-assembled unit, which is simply  
5 screwed into the chamber 51 of the valve body 12. This unit may then be secured in the chamber 51 with the help of a snap ring means 70, which is inserted in a circumferential groove in said chamber 51. This snap ring means 70 co-operates with a stop shoulder surface 72 on the actuation body 48, so as to mechanically define said second position of the actuation body 56 in the  
10 chamber 51. It will be noted that said first position of the actuation body 48 is mechanically defined by a stop shoulder surface 74 in the chamber 51, which is co-operating with a corresponding stop shoulder surface 76 on the actuation body 48.

When the check valve 44 is disabled, i.e. when the actuation body 48 is in  
15 its second position, the rear end of the actuation body 48 projects out of the valve body 12 (see Figure 2). The lateral surface of this rear end preferably bears a showy color mark 77, which is only visible when the actuation body is screwed out of its first position, i.e. when the check valve is disabled. It is consequently very easy to visually detect whether or not the check valve 44 is  
20 disabled.

As best seen in Figures 2 and 6 the flat front face 54 includes an hole arrangement for inserting therein a key, so as to be capable of transmitting by means of this key a torque to the actuation body 48, for screwing the latter from its first position into its second position and vice versa. In an preferred  
25 embodiment the hole arrangement consists of one central drilled hole 80, with several peripheral drilled holes 82', 82'', 82'''. Such drilled holes 80, 82', 82'', 82''' are easy to manufacture and provide a lot of possibilities for customizing the key, e.g. by changing the position, the diameter and the depth of the holes. In other words, a gas company may have its customized hole arrangement in  
30 the flat front face 54, so that it will be rather difficult to disable the check valve

44 for a person who does not have the key corresponding to the company's customized hole arrangement.

Figure 7 shows a preferred embodiment of a key 100 to be used for screwing the actuation body 48 from its first position into its second position and vice versa. This key 100 includes a handwheel 102 with a central rod 104  
5 having a front surface 105. Several pins 106, 108', 108'', 108''' project beyond the front surface 105 of the central rod 104.

The central hole 80 warrants an easy alignment of the key in the axis of the actuation body 48, by introducing therein the central pin 106 of the key. The  
10 peripheral pins 108', 108'', 108''' of the key 100 engage the peripheral holes 82', 82'', 82''' to transmit the screwing torque onto the actuation body 48. The more peripheral pins of the key co-operate to transmit the screwing torque, the thinner these pins and the smaller the diameter of the peripheral holes 82', 82'', 82''' may be. It will be appreciated that peripheral holes 82', 82'', 82''' with  
15 smaller diameters make it more difficult to unscrew the actuation body 48 with something else than an original key. It will also be appreciated that a key with three peripheral pins 108', 108'', 108''' warrants a very stable support for transmitting the screwing torque onto the actuation body 48. As shown in  
Figure 4, the central drilled hole 80 may be deeper than the peripheral drilled  
20 holes 82', 82'', 82''', so that the central pin 106 of the key may be longer than the peripheral pins 108', 108'', 108'''. This feature facilitates introducing the peripheral pins 108', 108'', 108''' of the key 100 into the peripheral holes 82', 82'', 82''', and allows to work with peripheral holes 82', 82'', 82''' having a reduced depth. It will be understood that peripheral holes 82', 82'', 82''' with a  
25 reduced depth make it more difficult to unscrew the actuation body 48 with something else than an original key.

In accordance with an important aspect of the present invention, a flat seal 90 (see Figure 1) is adhesively affixed to the front face 54 of the actuation body 48, so as to cover at least the peripheral holes 82', 82'', 82''', preferably  
30 also the central hole 80. In Figure 1 the seal 90 has about the same form and



size as the accessible front face 54 of the actuation body 48.

If the actuation body 48 is to be screwed from its first position into its second position for disabling the function of the check valve 44, the seal 90 must either be removed, which will most likely damage it, or it must be pierced  
5 at least above one of the holes 82', 82'', 82''' and 80. If the seal 90 is damaged, pierced or removed, it has to be concluded that somebody has tried to disable the check valve 44. In other words, as long as the seal 90 is undamaged, one can be reasonably sure that the check valve function has not been disabled and that the gas cylinder has e.g. not been refilled by an unauthorized person.

10 Disabling the check valve 44 is furthermore a very easy operation. First the central pin 106 of the key 100 pierces the seal 90 above the central hole 80 and engages this central hole 80, thus centering the key 100 in the axis of the actuation body 48. Then the tips of the peripheral pins 108', 108'', 108''' are arranged above the peripheral holes 82', 82'', 82''' by rotating the key around  
15 the central axis of the actuation body 48 and, if necessary, feeling with the peripheral pins of the key 100 where the peripheral holes 82', 82'', 82''' are located. By pushing the key in the direction of the actuation body 48, the seal 90 will be pierced by the tips of the peripheral pins 108', 108'', 108''' of the key 100, and the latter will engage the peripheral holes 82', 82'', 82'''. The actuation  
20 body 48 can now be easily screwed from its first position in its second position, thereby disabling the check valve 44.

It remains to be said that the seal 90 is preferably a self-adhesive seal, e.g. a vinyl sticker or a sticker made of any other suitable material. It bears advantageously a distinguishing mark of the owner of the gas cylinder or of the  
25 company refilling the cylinder. It may furthermore include predefined rupture lines, so that it will be torn into pieces, if one tries to remove it from the flat front face 54 of the actuation body 48.

Figure 8 shows an alternative embodiment of the gas container valve of the present invention. The valve 110 includes a screw-driven actuation device  
30 112 located opposite of a check valve 114. The check valve 114 corresponds

to the check valve 44 described above and will not be further described. The actuation device 112 includes a plug-shaped actuation body 116 screwed in an internal screw thread 118, which is cut in a cylindrical chamber located in a branch 120 of the valve body opposite of a branch 121 that contains the check valve 114. The actuation body 116 is screwable between a first position in which the check valve 114 is enabled (see Figure 8), into a second position, in which a stem 122 protruding from the actuation body 116 pushes the closing body 56 of the check valve 114 away from its check valve seat 34 to disable the check valve 114. As shown in Figure 8, a snap ring 123 co-operates with a stop shoulder surface on the actuation body 116, so as to mechanically define said first position of the actuation body 116. It will be noted that in this first position, a flat front face 124 of the actuation body 116 is flush with an annular surface 126 of the branch 120. This front face 124 includes an hole arrangement 126 for inserting therein a key as described above. A flat seal 130 is adhesively affixed to the front face 124 so as to cover the hole arrangement 126. If the actuation body 116 is to be screwed from its first position into the valve body for disabling the check valve 44, the seal 130 must either be removed, which will most likely damage it, or it must be pierced. If the seal 130 is damaged, pierced or removed, it has to be concluded that somebody has tried to disable the check valve 44. In other words, as long as the seal 130 is undamaged, one can be reasonably sure that the check valve function has not been disabled and that the gas cylinder has e.g. not been refilled by an unauthorized person.

## Claims

1. A gas container valve including:

a valve body (12);

a check valve (44) mounted in said valve body (12) so as to provide a residual pressure and/or a non-return function;

5 a screw-driven actuation device (46) associated to said check valve (44) for disabling its function, said actuation device (46) including a threaded actuation body (48), which is mounted in the valve body (12) so as to be screwable between a first position, in which it enables the function of said check valve (44), and a second position, in which it disables the function of  
10 said check valve (44); and

seal means (90) associated to said actuation device (46), so that said seal means (90) must be broken if said actuation body (48) is to be screwed from its first position into its second position for disabling the function of said check valve (44);

15 **characterized in that**

said screw-driven actuation device (46) is mounted in said valve body (12), so that only a flat front face (54) of said actuation body (48) is accessible when the actuation body (48) is in its first position;

20 said flat front face includes a hole arrangement (80, 82', 82'', 82''') for inserting therein a key (100), so as to be capable of transmitting to said actuation body (48) by means of said key a torque for screwing said actuation body (48) from its first position into its second position; and

said seal means consists of a flat seal (90) adhesively affixed to said accessible front face (54) of said actuation body (48) so as to cover said  
25 hole arrangement (80, 82', 82'', 82''').

2. The valve as claimed in claim 1, characterized in that said hole

arrangement consists of several drilled holes (80, 82', 82", 82''').

3. The valve as claimed in claim 1, characterized in that said hole arrangement consists of one central drilled hole (80) and at least three peripheral drilled holes (82', 82", 82''').
- 5 4. The valve as claimed in claim 3, characterized in that said central drilled hole (80) is deeper than said peripheral drilled holes (82', 82", 82''').
5. The valve as claimed in any one of claims 1 to 4, characterized in that said check valve (44) includes:
  - a valve check valve seat (34) associated to a gas passage in said valve  
10 body (12);
  - a closing body (56) associated to said check valve seat (34), said closing body (56) having a front end and a rear end, wherein the front end cooperates with said check valve seat (34) so as to be capable of sealingly obturating said gas passage in said check valve seat (34); and
  - 15 a spring (58) associated to said closing body (56), so as to urge said closing body (56) in the direction of said check valve seat (34).
6. The valve as claimed in claim 5, characterized in that
  - the rear end of said closing body (56) is slidably fitted in a bore (66) of said  
actuation body (48);
  - 20 said spring (58) is connected between said closing body (56) and said actuation body (48), so as to urge said closing body (56) with a predetermined force against said check valve seat (34) when said actuation body (48) is in its first position; and
  - said actuation body (48) is arranged in said valve body (12) so that the  
25 spring force acting on said closing body (56) decreases, when said actuation body (48) is screwed from its first position into its second position.
7. The valve as claimed in claim 6, characterized in that
  - said screw-driven actuation device (46) is mounted in said valve body (12),

so that the end of said actuation body (48) that carries said flat front face (54) projects out of said valve body (12) when the actuation body (48) is in its second position.

8. The valve as claimed in claim 6 or 7, characterized in that
  - 5    said valve further has a gas inlet port (24), a gas outlet port (38) and a seat chamber (44), said seat chamber (44) containing said check valve seat (34);  
      said gas passage has a first portion (22) connecting said gas inlet port (24) to said seat chamber (44) and a second portion extending downstream from said check valve seat (34) to said gas outlet port (38);
  - 10   said closing body (56) is arranged so as to be urged by said spring (58) against said check valve seat (34) in the direction of flow of the gas from said gas inlet port (24) to said gas outlet (38);  
  
      said rear end of said closing body (56) is sealingly received in said bore (66) of said actuation body (48), so as to axially delimit therein a pressure  
15    chamber;  
  
      a gas passage (68) extends through said closing body (56), so as to connect said pressure chamber (66) to said second portion (36) of said gas passage, when said front end of said closing body (56) is sealingly received on said check valve seat (34), and
  - 20   the cross-section sealed in said pressure chamber (66) by said closing body (56) is bigger than the cross-section sealed in said check valve seat (34) by said closing body (56).
9. The valve as claimed in any one of claims 5 to 8, characterized by a limit  
25   stop (68) in said bore (66) of said actuation body (48) for limiting the stroke of said closing element (56) in said bore (66) in the direction of said check valve seat (34).
10. The valve as claimed in any one of claims 5 to 9, characterized in that said first position of said actuation body (48) is mechanically determined by a stop shoulder surface (74) of said valve body (12).

11. The valve as claimed in any one of claims 5 to 10, characterized by a snap ring (70) cooperating with a stop shoulder surface (72) on said actuation body (48), so as to mechanically define said second position of said actuation body (48).
- 5 12. The valve as claimed in any one of claims 1 to 11, characterized by a stop valve assembly that is located upstream of said check valve (44).
13. The valve as claimed in claim 5, characterized in that
- the closing body (56) is slidably fitted in a bore of said valve body;
- said spring (58) is connected between said closing body (56) and said valve
- 10 body;
- said actuation body (116) is arranged in said valve body axially opposite of said closing body (56);
- said actuation body (116) includes a stem (122) pushing said closing body (56) away from its check valve seat (34), when said actuation body (116) is
- 15 in its second position;
- said actuation body (116) is arranged in said valve body so that its stem (122) does not prevent said spring (58) from urging said closing body (56) with a predetermined force against said check valve seat (34), when said actuation body (116) is in its first position.

## Abstract

A gas container valve includes a check valve (44) providing a residual pressure and/or a non-return function. A threaded actuation body (48) is screwable between a first position, in which it enables the function of the check valve (44), and a second position, in which it disables the function of the check valve (44). When the actuation body (12) is in its first position, only a flat front face (54) thereof is accessible. This flat front face (54) includes a hole arrangement (80, 82', 82'', 82''') for receiving a special key. A flat seal (90) is adhesively affixed to the accessible front face (54), so as to cover the hole arrangement (80, 82', 82'', 82'''). This seal (90) must be broken for disabling the function of the check valve (44) with the key.

(Fig. 4)

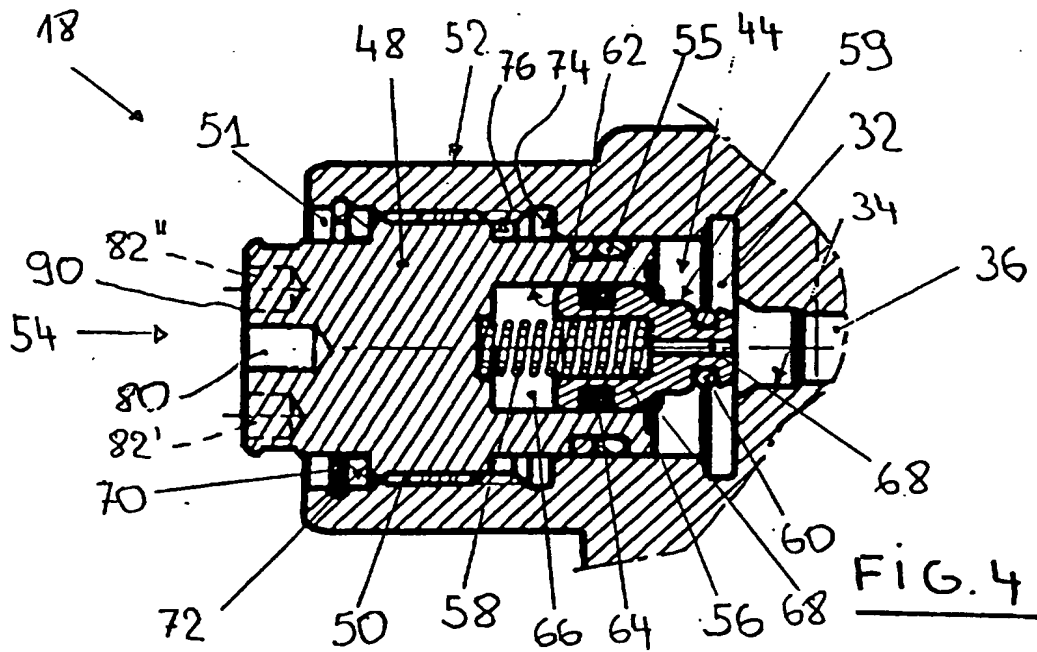


FIGURE A PUBLIER AVEC L'ABREGE



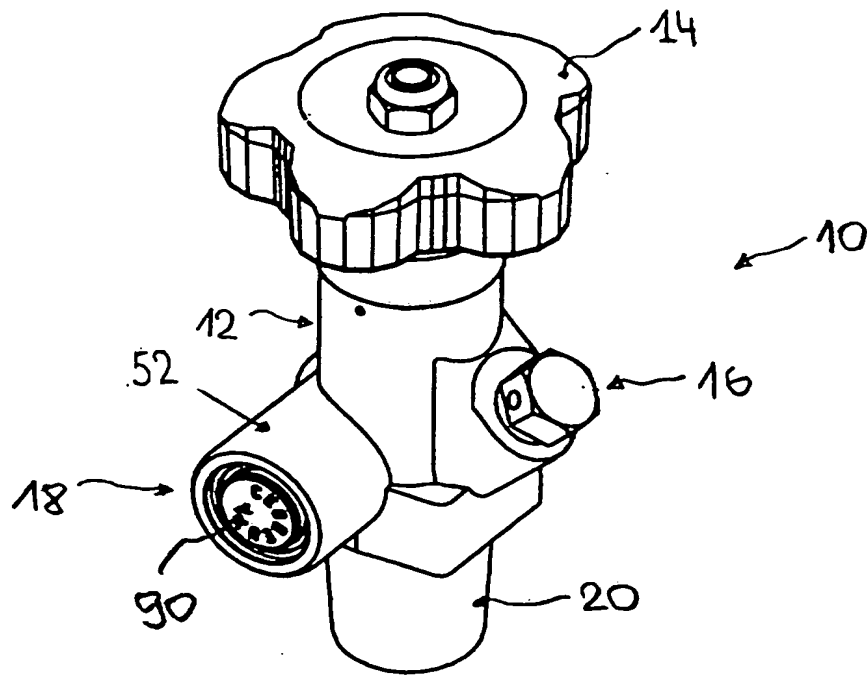


FIG. 1

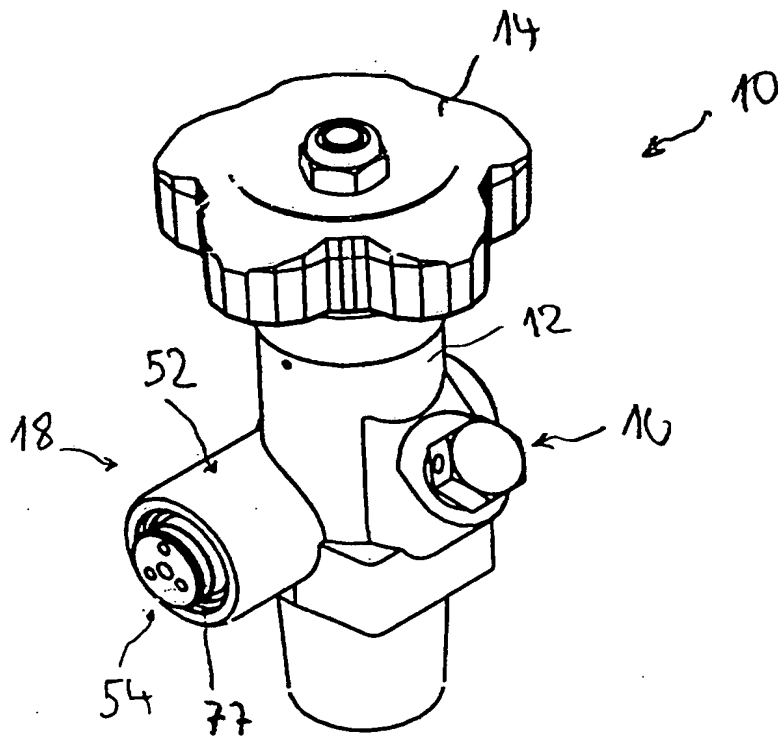


FIG. 2

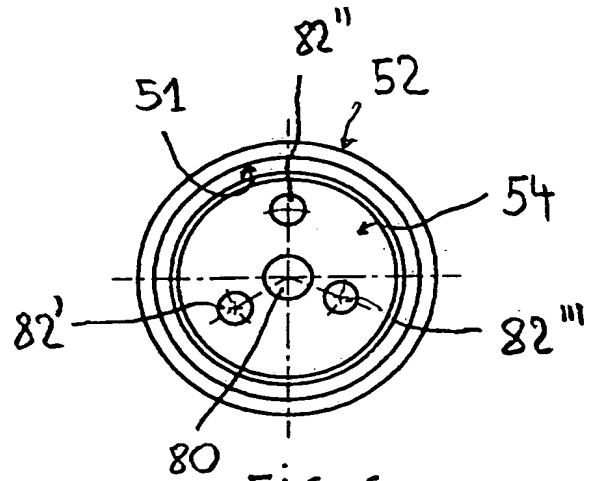
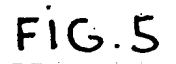
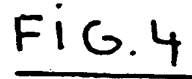
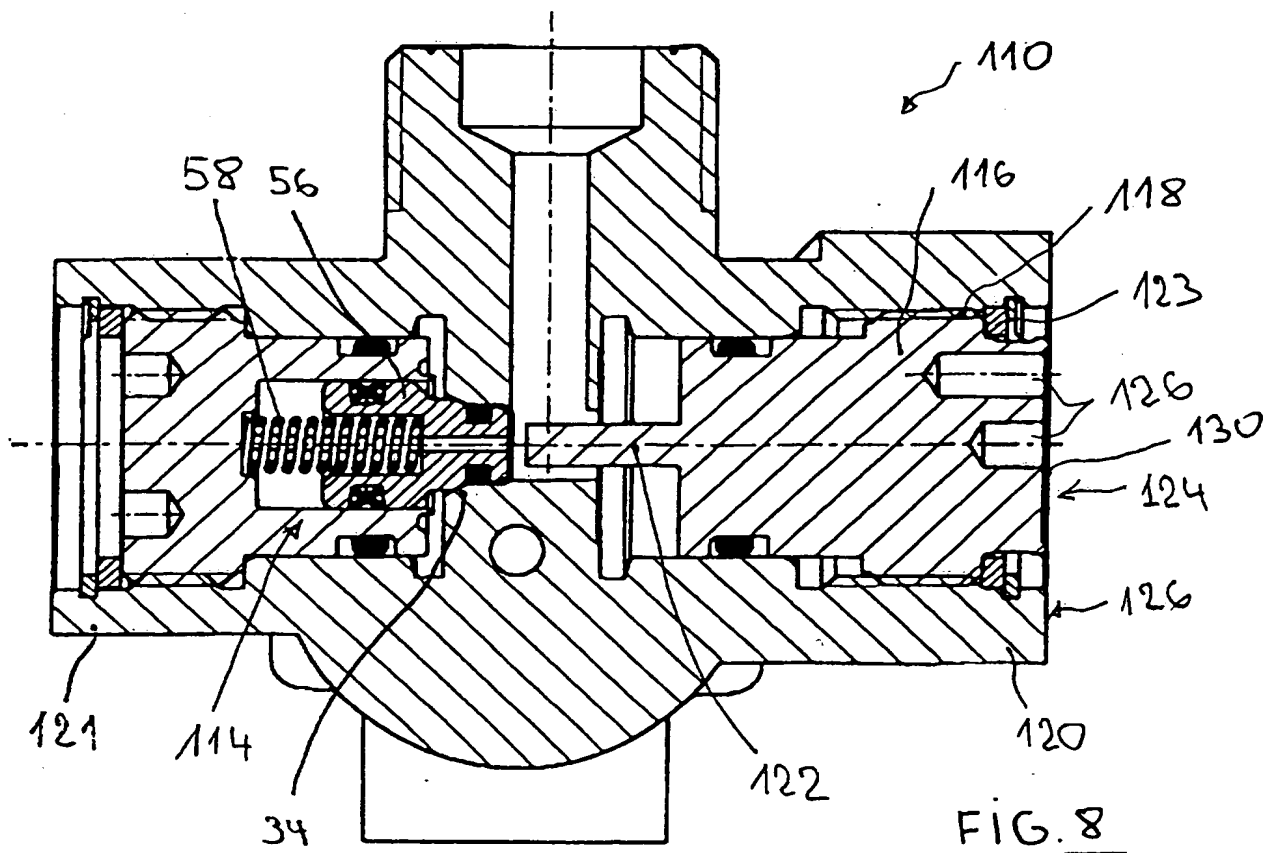
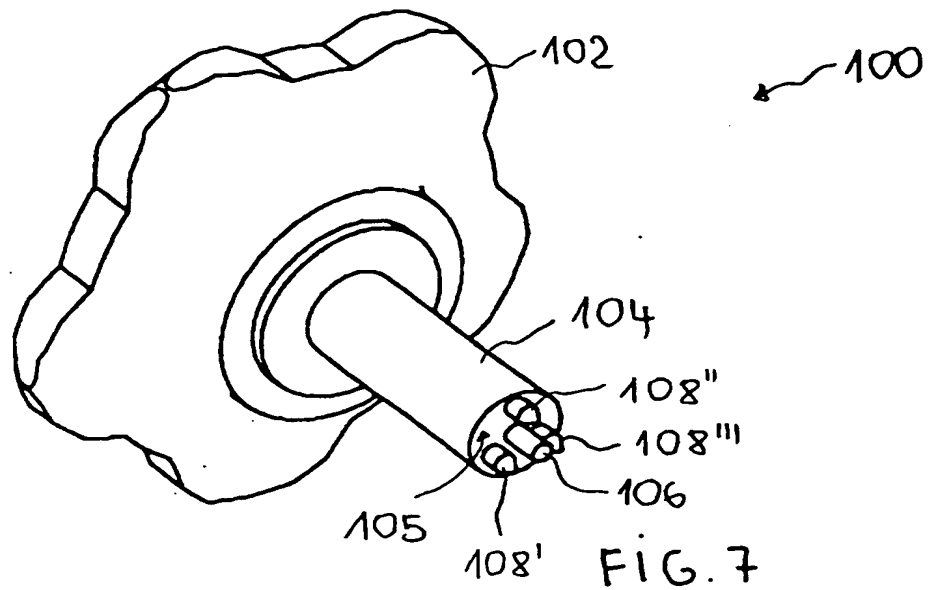


FIG. 6







MINISTÈRE DE L'ÉCONOMIE

Service  
de la Propriété Intellectuelle

## RAPPORT DE RECHERCHE

établi en vertu de l'article 35.1 a)  
de la loi luxembourgeoise sur les brevets d'invention  
du 20 juillet 1992Numero de la demande  
nationaleLO 24  
LU 90254

## DOCUMENTS CONSIDERES COMME PERTINENTS

Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes	Revendication concernée	CLASSEMENT DE LA DEMANDE (Int.Cl.6)
2 A	EP 0 688 983 A (NERIKI KK) 27 décembre 1995 * colonne 12, ligne 49 - colonne 13, ligne 34; figure 9 *	1,5,13	F16K1/30
2 A	US 2 645 241 A (RIEDE PETER M.) 14 juillet 1953 * colonne 3, ligne 42 - colonne 4, ligne 10; figures 1,4 *	1,5,12,13	
2 A	WO 82 03900 A (LOCKWOOD HANFORD N JR) 11 novembre 1982 * page 12, ligne 15 - ligne 33; figures 10,11 *	1	
			DOMAINES TECHNIQUES RECHERCHES (Int.Cl.6)
			F16K

1

Date d'achèvement de la recherche

15 mars 1999

Examineur

Christensen, J

## CATEGORIE DES DOCUMENTS CITES

X : particulièrement pertinent à lui seul  
 Y : particulièrement pertinent en combinaison avec un autre document de la même catégorie  
 A : arrière-plan technologique  
 O : divulgation non-écrite  
 P : document intercalaire

T : théorie ou principe à la base de l'invention  
 E : document de brevet antérieur, mais publié à la date de dépôt ou après cette date  
 D : cité dans la demande  
 L : cité pour d'autres raisons  
 & : membre de la même famille, document correspondant

**ANNEXE AU RAPPORT DE RECHERCHE  
RELATIF A LA DEMANDE DE BREVET LUXEMBOURGEOISE NO.**

**LO 24  
LU 90254**

La présente annexe indique les membres de la famille de brevets relatifs aux documents brevets cités dans le rapport de recherche visé ci-dessus.  
Lesdits membres sont contenus au fichier informatique de l'Office européen des brevets à la date du  
Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office européen des brevets.

**15-03-1999**

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